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COMBINED CATALYTIC OXIDATION AND ADSORPTION OF PRIORITY ORGANIC POLLUTANTS FOR WASTEWATER RECYCLING

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Abstract

The increased concentrations of priority pollutants in wastewaters have imposed the completion of conventional treatment with advanced treatment stages (such as catalytic oxidation, membrane processes, adsorption, ion exchange, etc.) for their removal by chemical degradation and/or physical separation.

In this study, 4-chlorophenol (4-CP) is proposed as model-pollutant for the priority organic pollutants present in synthetic wastewaters and several processes which can act as advanced treatment stages for this type of effluents have been analyzed. The concept was to analyze under a unitary framework the performances of a Fenton type oxidation process, in the presence of iron catalyst and hydrogen peroxide and an adsorption process on surfactant modified natural zeolites (SMZs) for the removal of 4-CP. The results have shown that the combined catalytic oxidation (homogeneous Fenton process) and adsorption process can be used to eliminate priority organic pollutant from wastewater (removal efficiencies of 100% 4-CP, 85% TOC and 89% COD for the combined process). The adsorption process is very efficient in removing the oxidation intermediates, significantly eliminating the effluent toxicity (between 78 and 100%).

Key words: advanced wastewater treatment, Fenton catalytic oxidation, 4-chlorophenol, toxicity tests, wastewater recycling

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